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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* ANDREAS ELEFThERIOU, BARRY BARNETT,  
JOE LANZINO, TOM MCDONOUGH, GEORGE GUGLELMIN,  
ENZO MACCHIA, and MELINDA BISSINGER

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Appeal 2018-005224<sup>1</sup>  
Application 13/189,059<sup>2</sup>  
Technology Center 3700

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Before MICHAEL C. ASTORINO, CYNTHIA L. MURPHY, and  
KENNETH G. SCHOPFER, *Administrative Patent Judges*.

SCHOPFER, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the rejection of  
claims 1, 5–18, 20–25, and 27. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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<sup>1</sup> Our decision references the Appeal Brief (“Appeal Br.,” filed Jan. 25, 2018), the Reply Brief (“Reply Br.,” filed Apr. 20, 2018), the Examiner’s Answer (“Ans.,” mailed Feb. 23, 2018), and the Non-Final Office Action (“Non-Final Act.,” mailed Mar. 23, 2017).

<sup>2</sup> According to Appellants, the real party in interest is Pratt & Whitney Canada Corp. Appeal Br. 2.

## BACKGROUND

According to Appellants, “[t]he application relates generally to gas turbine engines, and more particularly to components, such as airfoils, used in gas turbine engines.” Spec. ¶ 2.

## CLAIMS

Claims 1, 21, 22, and 27 are the independent claims on appeal.

Claim 1 is illustrative of the appealed claims and recites:

1. A compressor stator for a gas turbine engine, the stator comprising:

an annular outer shroud, an annular inner shroud located radially inwardly of and concentric with the outer shroud, a plurality of hybrid vanes each including an airfoil extending between a vane root retained in the outer shroud and a vane tip retained in the inner shroud; the outer shroud, the inner shroud, the airfoil, the vane root, and the vane tip all being formed of a core of a non-metallic substrate fully encapsulated by a nanocrystalline metal shell topcoat, the substrate being formed of a polymer, the nanocrystalline metal shell topcoat defining outer surfaces of each of the inner shroud, the outer shroud, the airfoil, the vane root, and the vane tip.

Appeal Br. 14.

## REJECTIONS

1. The Examiner rejects claims 1, 5, 15–17, 20, 22, and 25 under 35 U.S.C. § 103(a) as unpatentable over Cairo<sup>3</sup> in view of Kunz<sup>4</sup> and Simmons.<sup>5</sup>

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<sup>3</sup> Cairo et al., US 2008/0170943 A1, pub. July 17, 2008.

<sup>4</sup> Kunz et al., US 4,655,682, iss. Apr. 7, 1987.

<sup>5</sup> Simmons, US 4,063,847, iss. Dec. 20, 1977.

2. The Examiner rejects claims 6–10, 13, 14, 21, 23, and 24 under 35 U.S.C. § 103(a) as unpatentable over Cairo in view of Kunz, Simmons, and Palumbo.<sup>6</sup>
3. The Examiner rejects claims 11, 12, and 27 under 35 U.S.C. § 103(a) as unpatentable over Cairo in view of Kunz, Simmons, Palumbo, and Smith.<sup>7</sup>
4. The Examiner rejects claims 16 and 25 under 35 U.S.C. § 103(a) as unpatentable over Cairo in view of Kunz, Simmons, and Tomantschger.<sup>8</sup>
5. The Examiner rejects claim 18 under 35 U.S.C. § 103(a) as unpatentable over Cairo in view of Kunz, Simmons, and Darrow.<sup>9</sup>

#### DISCUSSION

Appellants rely on the same arguments with respect to all independent claims on appeal. *See* Appeal Br. 5–12. We address claim 1 below, and our analysis is equally applicable to the other independent claims.

With respect to claim 1, the Examiner finds that Cairo teaches a compressor stator for a gas turbine engine including a plurality of hybrid vanes with airfoils extending between a vane root and a vane tip and including a non-metallic substrate for each that is “fully encapsulated by a nano-crystalline metal shell topcoat” to achieve the benefits of hardness and wear resistance. Non-Final Act. 4–5 (citing Cairo ¶¶ 4, 18–21, 23, 24). The Examiner also finds that Cairo discloses attachment structures, i.e., spindles and trunnions, which indicate that the vanes are attached to inner and outer

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<sup>6</sup> Palumbo et al., US 7,354,354 B2, iss. Apr. 8, 2008.

<sup>7</sup> Smith et al., US 5,881,972, iss. Mar. 16, 1999.

<sup>8</sup> Tomantschger et al., US 2010/0304171 A1, pub. Dec. 2, 2010.

<sup>9</sup> Darrow et al., US 4,023,249, iss. May 17, 1977.

shrouds, “which are well known in the art parts of a compressor.” *Id.* at 5. However, the Examiner acknowledges that Cairo does not teach the use of inner and outer shrouds “composed of a non-metallic substrate core that is fully encapsulated with a topcoat of the nano-crystalline metal.” *Id.*

The Examiner next finds that both Kunz and Simmons teach the use composite shrouds that provide the advantage of having lighter weight than metallic shrouds. *Id.* (citing Kunz col. 1, ll. 32–49; col. 2, ll. 33–50; col. 4, ll. 3–14, 34–49; Simmons col. 1, ll. 1–27). The Examiner concludes that it would have been obvious to use composite shrouds with metallic topcoats with vanes of Cairo in order to achieve both the benefit of a lighter weight shroud and the benefits of hardness and wear resistance provided by the topcoat. *Id.* at 5–6.

We agree with and adopt the Examiner findings and conclusions with respect to the rejection of claim 1. *See* Non-Final Act. 2–6; *see also* Ans. 2–7. As discussed below, we are not persuaded of error by Appellants arguments.

Appellants first argue that Cairo does not teach and the Examiner has improperly inferred “the presence of inner and outer shroud rings in Cairo.” Appeal Br. 8. Appellants assert that the Examiner’s finding in this regard is speculative, and to the extent the Examiner’s is taking official notice that shrouds are well known features, Appellants assert that “the Examiner has not exercised the caution required by [the] MPEP and other authorities when taking official notice of facts not on the record.” *Id.* at 8–9.

We are not persuaded of error for the reasons provided by the Examiner. *See* Ans. 2–5. In particular, we agree that Cairo and the modifying references make clear that the use of inner and outer shrouds is

well known, and are, in fact, contemplated by the disclosure of Cairo. For example, Cairo discloses a compressor and vanes in a compressor, and Cairo discloses that the vanes have spindle and trundle portions. *See* Cairo ¶¶ 1, 17, 18. We agree with the Examiner that one of ordinary skill in the art would understand that such vanes would be attached to inner and outer shrouds in a compressor with the spindle and trundle portions even though Cairo does not expressly disclose inner and outer shroud portions. *See* Ans. 3. We also agree that the other art of record makes clear that the use of inner and outer shrouds were known in the art. *See, e.g.*, Kunz col. 1, ll. 17–25. Thus, one of ordinary skill would recognize that a mounted vane in a compressor, as in Cairo, is mounted between inner and outer shrouds.

Second, Appellants argue that Cairo teaches only coating the airfoil and does not support the Examiner’s findings regarding coating other portions of the platform or shroud. Appeal Br. 9–10. Appellants assert that “[n]othing disclosed by Cairo suggests any benefit or advantage associated with extending the metal coating beyond the airfoil, and Cairo provides no motivation . . . to do so.” *Id.* at 10. We are not persuaded of error for the reasons provided by the Examiner. *See* Ans. 5–7. In particular, the Examiner makes clear that support for the rejection is found in the combination of art, and not in Cairo alone. Specifically, the Examiner notes that Cairo “acknowledges the use of a metal coating to protect composite elements, and the benefits of such.” Ans. 6. The Examiner acknowledges that Cairo only applies a metal coating to the airfoil. *Id.* However, the Examiner relies on the modifying references to show the use of composite materials for the inner and outer shrouds in order to reduce the weight of the compressor. *Id.* And the Examiner concludes that it would have been

obvious to not only construct the shrouds of composite materials as taught by Kunz and Simmons, but to also coat the shrouds in a metallic topcoat as taught by Cairo in order to gain both the benefits of reduced weight as well as the hardness and corrosion resistance that the metallic coating provides. *Id.* at 6–7. Thus, Appellants argument regarding Cairo alone does not persuade us of error the rejection, which relies on the teachings of each of the references to conclude that the claimed metallic coating would have been obvious.

Based on the foregoing, we are not persuaded of error in the rejection of claim 1. Accordingly, we sustain the rejection of claim 1. As indicated above, Appellants rely on the same arguments for the rejections of the other independent claims. Accordingly, we sustain the rejections of independent claims 21, 22, and 27. Further, Appellants do not provide separate arguments regarding any dependent claims, and thus, we sustain the rejections of dependent claims 5–18, 20, and 23–25.

#### CONCLUSION

We AFFIRM the rejections of claims 1, 5–18, 20–25, and 27.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED